

WHAT IS CLAIMED IS:

1 1. A method for isolating failed routing resources on a programmable
2 integrated circuit, the method comprising:
3 receiving a set of failed test patterns that generated erroneous results when
4 applied to a set of failed test paths, the failed test paths connecting together routing resources
5 on the programmable integrated circuit;
6 identifying a subset of the routing resources that occur most frequently in the
7 failed test paths; and
8 generating new test patterns including new test paths for the subset of the
9 routing resources that occurred most frequently in the failed test paths.

1 2. The method according to claim 1 further comprising:
2 testing the new test patterns using a test system to isolate routing resources
3 among the subset of the routing resources that caused the erroneous results in the failed test
4 patterns.

1 3. The method according to claim 1 wherein generating the new test
2 patterns for the subset of the routing resources further comprises:
3 generating new test patterns for new test paths that route through every
4 combination of fan-in resources and fan-out resources that are programmably connectable to
5 each of the subset of the routing resources.

1 4. The method according to claim 1 wherein generating the new test
2 patterns for the subset of the routing resources further comprises:
3 generating new test patterns for test paths that route through clock and clear
4 signal routing resources.

1 5. The method according to claim 1 wherein each of the failed test paths
2 and the new test paths connect a control point to an observation point on the programmable
3 integrated circuit.

1 6. The method according to claim 1 wherein the routing resources have
2 more than 1000 times as many routing resources as the subset of routing resources.

1 7. The method according to claim 5 further comprising:

2 receiving a test log file that indicates the observation points for the failed test
3 paths.

1 8. The method according to claim 1 wherein identifying the subset of the
2 routing resources that occur most frequently in the failed test paths further comprises:
3 extracting the routing resources that are connected along each of the failed test
4 paths using a connectivity graph.

1 9. A computer program product encoded on a computer readable medium
2 for isolating failed routing resources on a programmable integrated circuit, the computer
3 readable medium comprising:

4 code for receiving a set of failed test patterns generating erroneous results
5 when applied to a set of failed test paths that connect together routing resources on the
6 programmable integrated circuit and identifying a subset of the routing resources that occur
7 most frequently in the failed test paths; and

8 code for generating new test patterns including new test paths for the subset of
9 the routing resources that occurred most frequently in the failed test paths.

1 10. The computer program product of claim 9 wherein the code for
2 receiving and identifying further comprises:

3 code for receiving a test log file that indicates observation points for the failed
4 test paths.

1 11. The computer program product of claim 9 wherein the code for
2 generating further comprises:

3 code for generating new test patterns for test paths that route through clock
4 and clear signal routing resources.

1 12. The computer program product of claim 9 further comprising:

2 code for testing the new test patterns to isolate routing resources among the
3 subset that caused the erroneous results in the failed test patterns.

1 13. The computer program product of claim 9 wherein the code for
2 generating further comprises:

code for generating new test patterns that route through every combination of fan-in resources and fan-out resources that are programmably connectable to each of the subset of the routing resources.

14. The computer program product of claim 9 wherein the routing resources have more than 10,000 times as many routing resources as the subset of the routing resources.

15. A computer system for isolating failed routing resources on a programmable integrated circuit, the computer system comprising:
a statistical failure isolation (SFI) tool that identifies a subset of routing resources that occur most frequently in failed test paths, wherein the SFI tool receives a set of failed test patterns that generated erroneous results when applied to the failed test paths, the failed test paths connecting together the routing resources on the programmable integrated circuit; and
an adaptive failure isolation (AFI) tool that generates new test patterns including new test paths for the subset of the routing resources that occurred most frequently in the failed test paths.

16. The computer system according to claim 15 wherein the SFI tool also receives a test log file that indicates observation points for the failed test paths.

17. The computer system according to claim 15 further comprising:
a test system that tests the new test patterns to isolate routing resources among the subset that caused the erroneous results in the failed test patterns.

18. The computer system according to claim 15 wherein:
the AFI tool generates new test patterns for new test paths that route through every combination of fan-in resources and fan-out resources that are programmably connectable to each of the subset of the routing resources.

19. The computer system according to claim 15 wherein the routing resources have more than 1000 times as many routing resources as the subset of routing resources.

1 20. The computer system according to claim 15 wherein the SFI tool
2 extracts the routing resources that are connected along each of the failed test paths using a
3 connectivity graph.